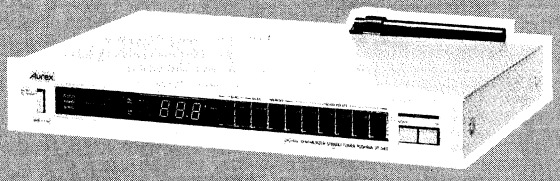
SERVICE DATA
FILE NO. 170-130

TOSHIBA

DIGITAL SYNTHESIZER TUNER

ST-S45



SPECIFICATIONS

■ **General Data**

Power supply:	220V ∿ 50 Hz for Europe 240V ∿ 50 Hz for United Kingdom & Australia
Power consumption:	15W
System dimensions:	420(W) x 73(H) x 286.5(D) mm
System weight:	3.0 kg

■ **Tuner**

Micro computer controlled synthesizer tuning

Frequency range:	FM: 87.50 ∿ 108.00 MHz 410 channel AM: 522 ∿ 1602 kHz 120 channel
Memory:	6 channels each band (FM/AM)
Functions:	Manual scanning (FM 50 kHz step, AM 9 kHz step)

■ **FM Tuner Section**

Sensitivity (IHF):	1.9 μV (10.8 dBf)
Harmonic distortion:	1 kHz MONO 0.15% STEREO 0.25%
S/N:	MONO 72 dB STEREO 68 dB
Frequency response:	30 ∿ 15 kHz ± 1.0 dB
Selectivity (IHF):	75 dB (±300 kHz)
Image rejection:	50 dB
IF rejection:	80 dB
Capture ratio:	1.0 dB
Spurious response:	70 dB
AM suppression:	55 dB
Stereo separation:	40 dB (at 1 kHz)

■ **AM Tuner Section**

Receiving frequency:	522 ∿ 1602 kHz (9 kHz step)
Sensitivity:	200 μV/m
Selectivity:	30 dB
Image rejection:	50 dB
S/N:	55 dB

Specifications subject to change without notice.

TE, TU, AY

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1. OPERATING CONTROLS

① **Fine tuning**
One of a pair of triangular red LEDs shows the proper direction for further tuning (up or down) by the tuning button. When the station is optimally tuned, the green LED between the triangular red LEDs lights up and neither red LED remains lighted.

② **FM stereo indicator lamp**
This lamp is illuminated when an FM stereo broadcast is being received.

③ **Function switch**
Depress this switch to turn the power on, depress once more to put the equipment into the stand by mode.

Radio band selector buttons
Choose the programme source by pressing one of these buttons:

④ **Signal level**
These LED lamps light up successively from left to right according to the strength of the signal being received. If fewer than four or five lamps light up when a local station is tuned, check aerial connections and direction.

⑤ **Digital frequency**
The tuned frequency on either band (FM or AM) is displayed here in digital form.

⑥ . . . . .for FM radio broadcasts

⑦ . . . . .for AM radio broadcasts

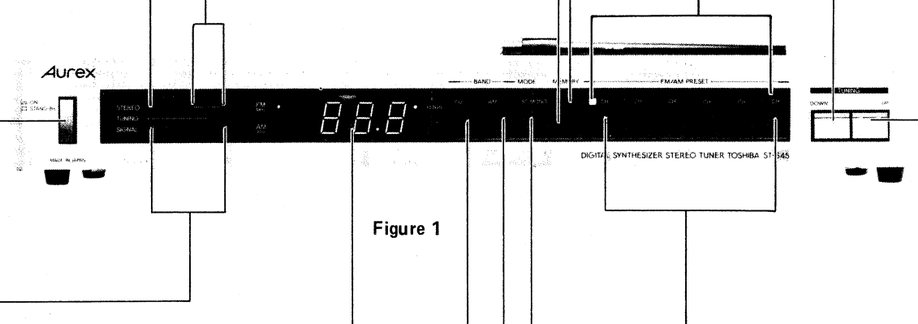


Figure 1

⑧ **Memory button**
To store the frequency of any desired station in the memory, first tune the frequency and then press this button. The memory indicator lamp ⑩ located in this button lights up, indicating that the memory is ready to accept the frequency. But note that the indicator lamp remains illuminated for only about 5 seconds.

⑨ **Mode (mono/stereo) selector**
In "stereo" position, the tuner is set to receive either stereo or mono FM broadcasts. Interstation noise is reduced by a muting function incorporated with this position. To reduce noise and improve reception when tuning a very distant station, switch to "mono" setting. If the mode selector is in "mono" setting when a preset station is tuned by means of the corresponding preset tuning button, the mode remains in "mono" setting. When one of the radio band selector buttons ⑥, ⑦ is pressed or function switch ③ is turned from "on" to "standby", the mode is automatically switched to "stereo" setting.

⑩ **Memory indicator lamp**
This LED lamp lights up for approximately 5 seconds when the memory button ⑧ is pressed, indicating that the memory will accept a frequency for presetting during that period.

⑪ **Preset indicator lamp**
One of these LED lamps is illuminated whenever the corresponding preset tuning button ⑭ is pressed.

⑫ **Down**
When the "down" tuning button is pressed, the tuned frequency is decreased in 50 kHz steps. This stepwise change in frequency continues until the button is released.

⑬ **Up**
Similarly, when the "up" tuning button is pressed, the tuned frequency is increased in 50 kHz steps until the button is released. An electronic beeper sounds when any of the preset tuning buttons ⑭ or the radio tuning buttons ⑫ and ⑬ are pressed. A single beep is heard when a preset tuning button is pressed. A single beep also sounds when either of the radio tuning buttons is pressed, and is followed by shorter beeps for as long as the button remains depressed. The electronic beep is coded by tone to distinguish which broadcast band (FM or AM) is set.

⑭ **Preset tuning buttons (1 – 6)**
Whilst the memory indicator lamp ⑩ is illuminated, press one of these buttons. ⑪ The frequency of the desired station is now stored in the memory. To tune in that frequency later, simply press the same tuning button.

2. SYSTEM CONNECTIONS

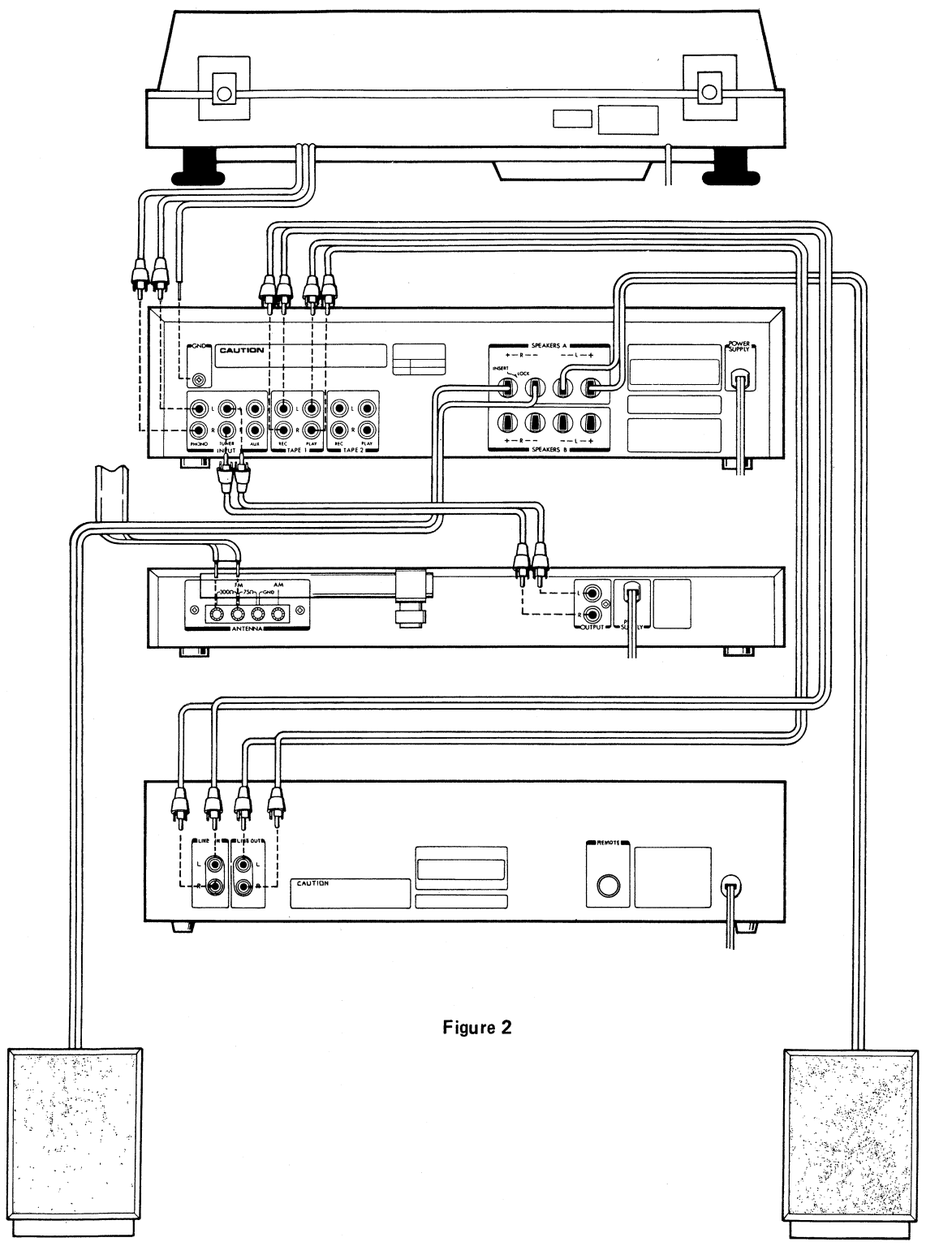


Figure 2

3. CONNECTION

(1) Terminals are provided for both 300 ohm and 75 ohm FM aerials. Please be sure to connect your aerial to the proper terminals.
(2) When listening to the AM band, adjust the bar aerial to the optimum direction for good reception. And in areas where the signal is weak, connect an external aerial (optional) to the AM terminal as shown on Figure 4 of this manual.
(3) Connect the output terminals of the tuner to the tuner input terminals of your amplifier, making sure that the L and R cables are not reversed.

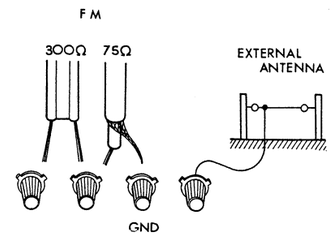


Figure 3

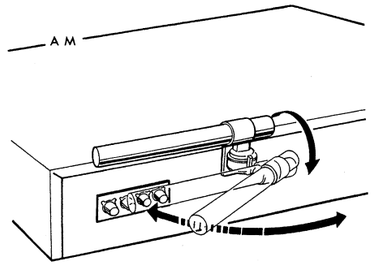


Figure 4

4. TUNER OPERATION

First press the desired radio band selector button ⑥ or ⑦.

- **Tuning**

Press the down ⑫ or up ⑬ tuning button, keeping it depressed as the frequency display shifts toward the desired station frequency. When close to that frequency, release the button, then press again in single steps to tune in the station exactly.

- **Preset Tuning**

The major feature of the ST-S45 is the digital synthesizer tuner section and its capacity to memorize six separate stations on each of the two bands, for a total of 12 stations. Once a station is preset in the memory, it may be tuned instantly and accurately whenever desired by lightly pressing one button.

(1) First check the official broadcast frequency of the desired stations (up to six stations on each band), or simply tune in the stations as described above in Tuning.
(2) After confirming that the station is accurately tuned, press the memory button ⑧. The memory indicator lamp ⑩ in it will light up for about 5 seconds, showing that the memory is ready to store the frequency.
(3) Immediately press one of the preset tuning buttons ⑭, while the memory indicator lamp remains lighted. If the lamp goes off before the desired preset tuning button can be pressed, just press the memory button again.
(4) Repeat this procedure for each station to be stored in the memory.
(5) To tune in one of these preset stations later, make sure that the proper band is selected, then lightly press the preset tuning button corresponding to that station.

Note 1. In West Germany and a few other countries, assigned station frequencies are specified to 50 kHz (89.95 MHz or 89950 kHz, for example), rather than usual 100 kHz.

Note 2. To retain the contents of the memory, a small electric current flows through the unit even when the function switch is in stand by position. When the unit is not in use for a long period, it should be unplugged from the mains. But note that if this power interruption is longer than one day, preset memory is lost and those stations must be reset. To prevent loss of memory contents, do not unplug the power cord or turn off the switch at the wall socket for any length of time during normal use.

5. DISASSEMBLY INSTRUCTIONS

TOP COVER REMOVAL

1. Remove four screws Ⓐ (3ϕ x 6mm) holding the top cover and one screw Ⓑ (3ϕ x 8mm) holding the top cover and the rear panel, then the top cover can be removed out. (See Figure 5 and 6)

BOTTOM PLATE REMOVAL

1. Remove five screws Ⓒ (3ϕ x 8mm) and one screw Ⓛ (3ϕ x 5mm) holding the bottom plate, then the bottom plate can be removed out. (See Figure 7)

FRONT PANEL REMOVAL

1. Remove six screws Ⓓ (3ϕ x 6mm) holding the front panel, then the front panel assembly can be removed out. (See Figure 7 and 8).

SWITCH AND LED P.C. BOARD REMOVAL

1. Remove four screws Ⓔ (3ϕ x 6mm) holding the Switch and LED P.C. Board, then Switch and LED P.C. Board and the LED holder can be removed out. (See Figure 8)
2. Remove UP/DOWN button Ⓕ (See Figure 9)

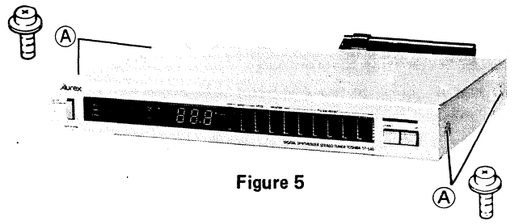


Figure 5

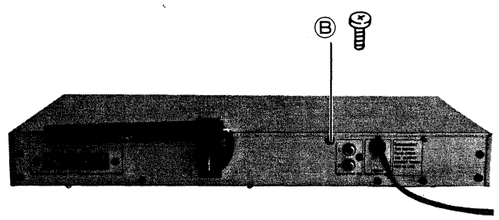


Figure 6

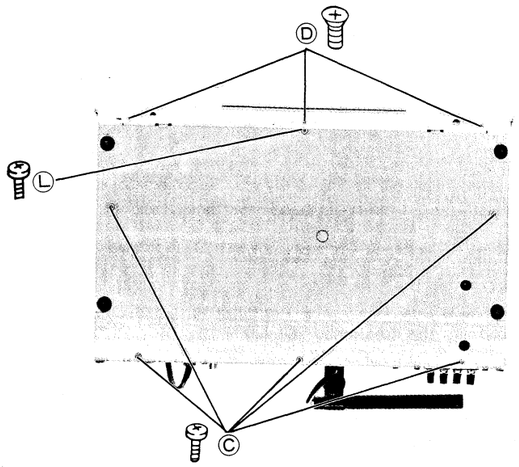


Figure 7

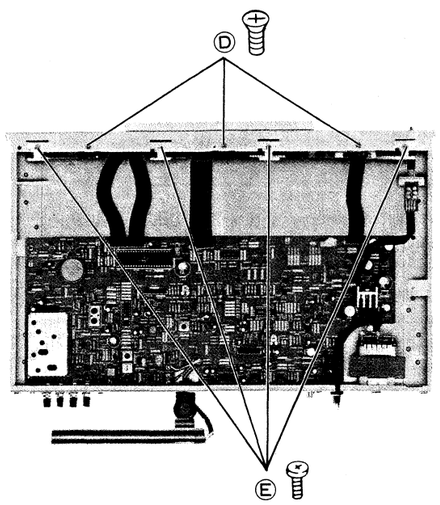


Figure 8

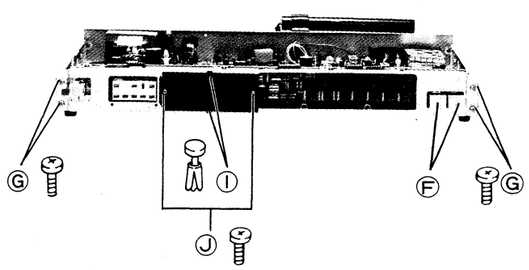


Figure 9

3. Remove four screws Ⓖ (3ϕ x 6mm) and three plastic rivets Ⓗ holding the front chassis. (See Figure 9 and 10).
4. Remove two plastic rivets Ⓘ (3ϕ x 6mm) and two screws Ⓙ (2ϕ x 3mm) holding display P.C. Board. (See Figure 9)
5. Remove two hex nuts Ⓚ holding the display P.C. Board on the front chassis, then display P.C. Board can be removed out. (See Figure 11).

CAUTION

When removing display P.C. Board, care must be taken.

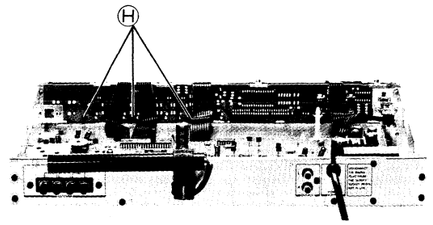


Figure 10

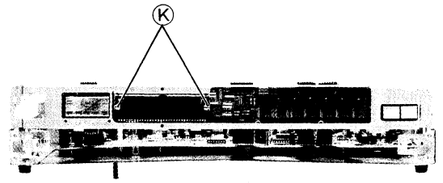


Figure 11

7. ADJUSTMENTS

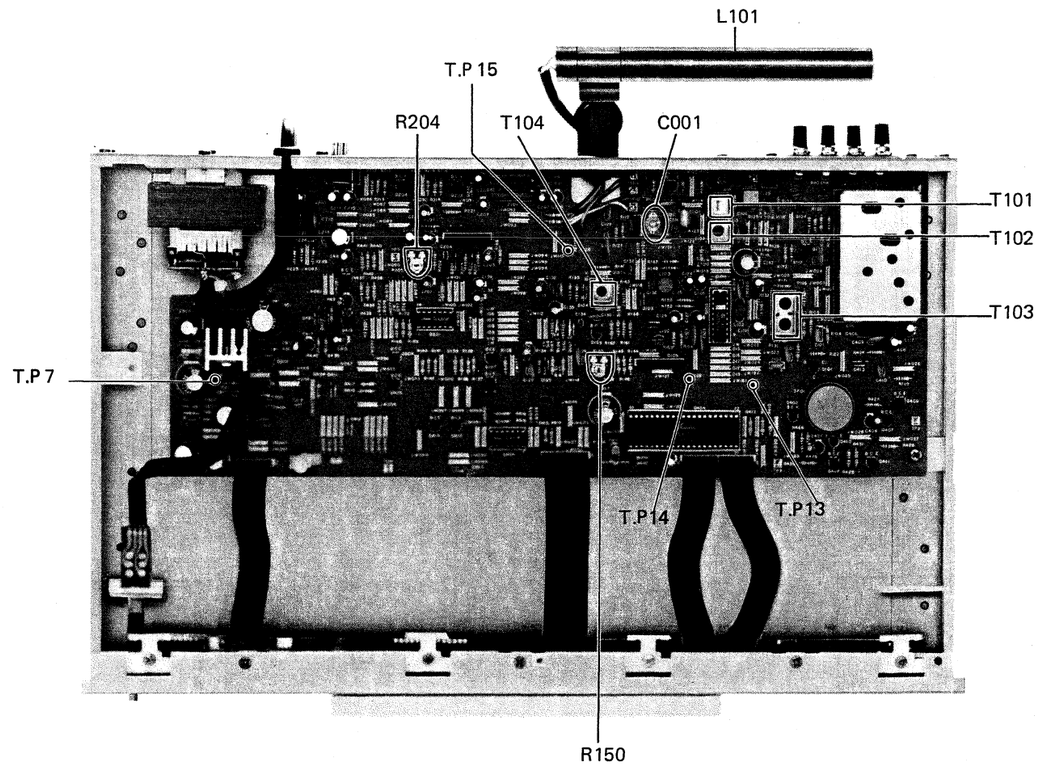


Figure 12

AM ADJUSTMENT

Test equipments/Tools required

1. Signal generator (with frequency counter)
2. Sweep generator
3. Test loop Antenna
4. Adjusting screwdriver
5. Oscilloscope
6. Dummy load resistor

IF ADJUSTMENT/STOP SIGNAL ADJUSTMENT

Step	Adjustment	Remarks
IF Response	T101	Adjust the scope pattern with specified marker (450 kHz) as illustrated in Fig. 13.

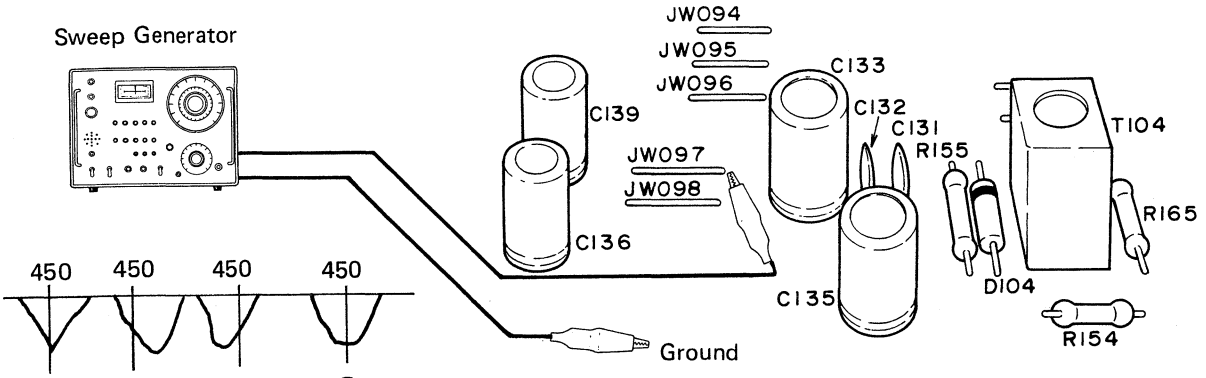


Figure 13

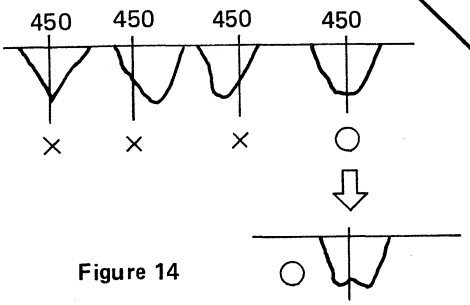


Figure 14

AM ADJUSTMENT

1. Set function switch to AM.
2. Set signal generator frequency as listed in AM ADJUSTMENT CHART.
3. Proceed as outlined in the TABLE AM ADJUSTMENT CHART.

AM ADJUSTMENT CHART

Step	Signal Generator Connection	Signal Generator Frequency	Display Frequency	Connection	Adjustment	Remarks
$V_D \phi$	———	———	522.0 kHz	TP15	T102 (RED)	Tester DC 2 ± 0.3V
	———	———	1602.0 kHz	TP15	Confirm	Tester DC 20.5 ± 1V
1	Test Loop	603 kHz	603.0 kHz	VTVM across Output	L101 (WHT)	Adjust for Maximum
2	Test Loop	1404 kHz	1404 kHz	VTVM across Output	AM Aer. Trim. C001	Adjust for Maximum
3	Repeat above steps until no further improvement is noticed.					

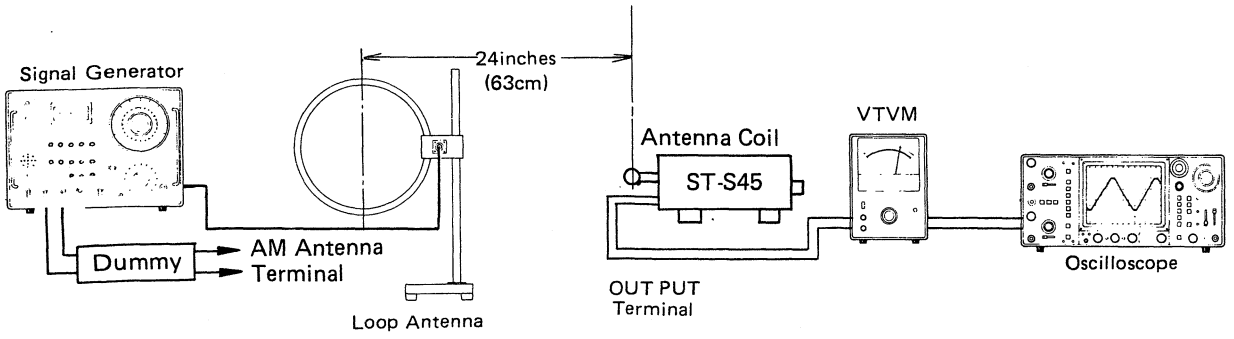


Figure 14

FM IF ADJUSTMENT

1. Set function switch to FM.
2. Set signal generator frequency as listed in FM IF ADJUSTMENT CHART.
3. Proceed as outlined in the TABLE FM IF ADJUSTMENT CHART.

Step	Adjusting Circuit	Connection		SG Frequency	Position of Tuning Dial	Adjustment	VTVM
		Input	Output				
1	IF distortion Adjustment (MONO)		Connect Tuning Meter to TP13, TP14		No signal	T103 (Primary P)	Adjust tuning meter pointer so as to keep center.
2	Meter Deflection Adjustment	Connect FM Signal generator to FM antenna Terminal		1 kHz 60 dB	Tune to 1 kHz Signal	R150	Adjust for 5 LEDs to light.

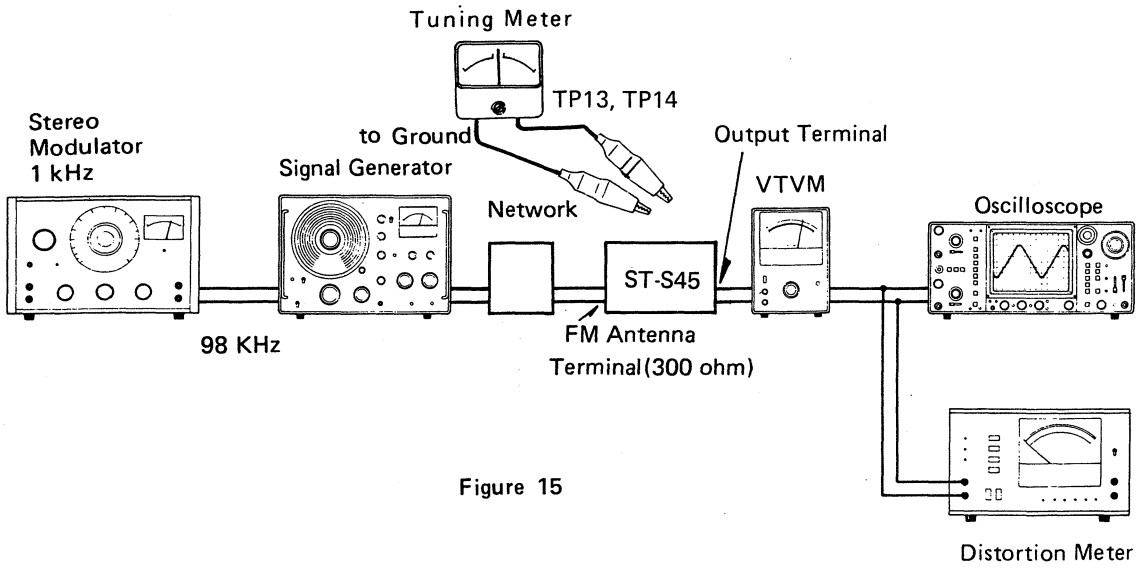


Figure 15

FM MPX ADJUSTMENT

	Input	VTVM or Oscilloscope Connection	Adjustment	Remarks
Free-runing Frequency Adjustment	Sub Signal of Stereo Modulator	TP7	R204	Adjust for Maximum

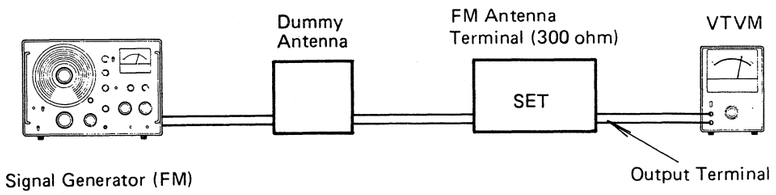


Figure 16

CAUTION: When realigning the FM Receiving Frequency, the lower side of the frequency range must not be below 87.5 MHz in order to comply with FTZ regulations in West Germany.

Note: As a countermeasure for preventing the trouble in the strong frequency signal areas, fix the diode (D001-1N60) on the main P.C. Board as shown below.

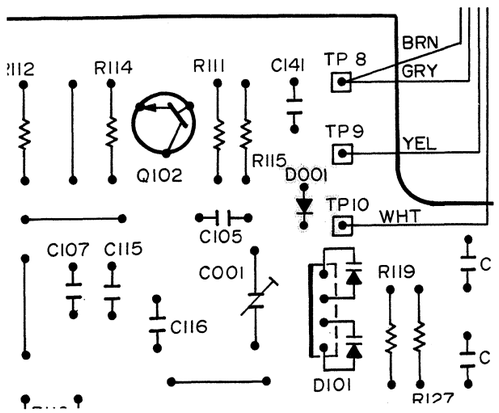


Figure 17

Installing Position of Diode (D001-1N60)

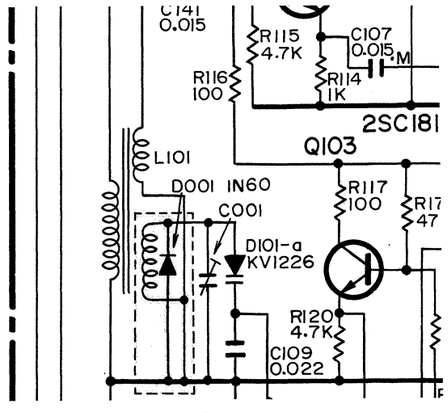


Figure 18

Connecting Position of Diode (D001-1N60)

6. BLOCK DIAGRAM

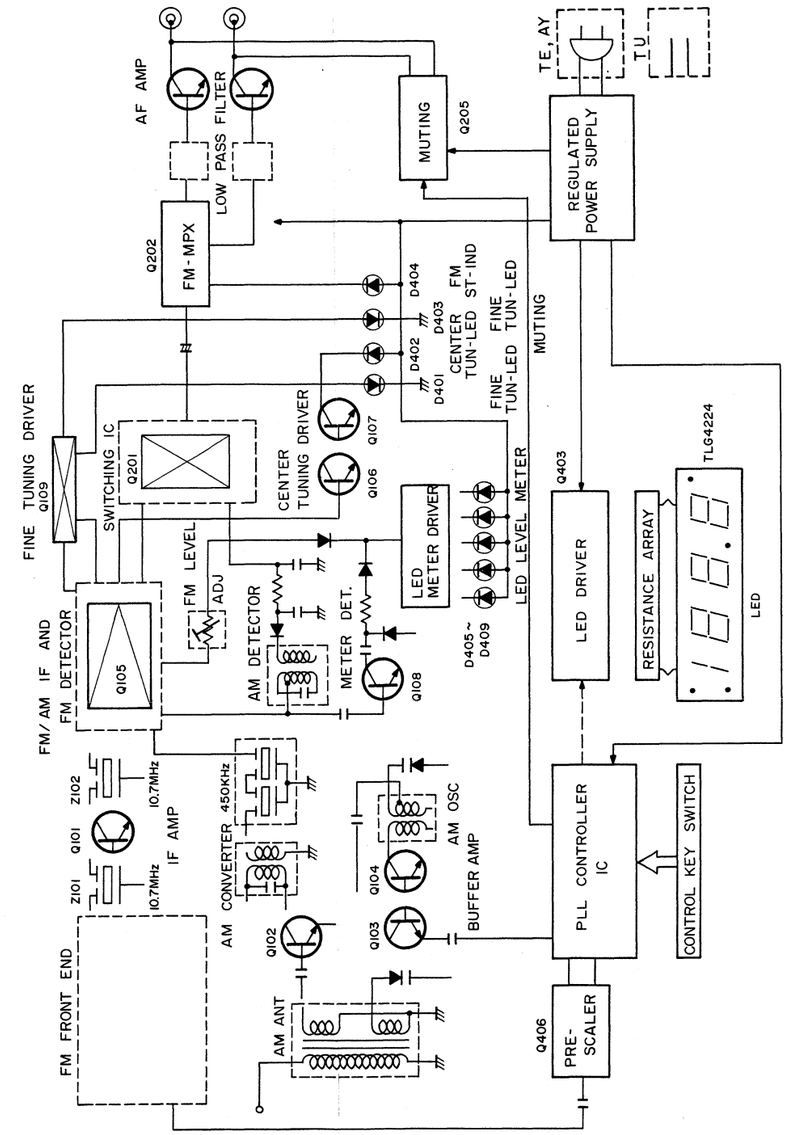
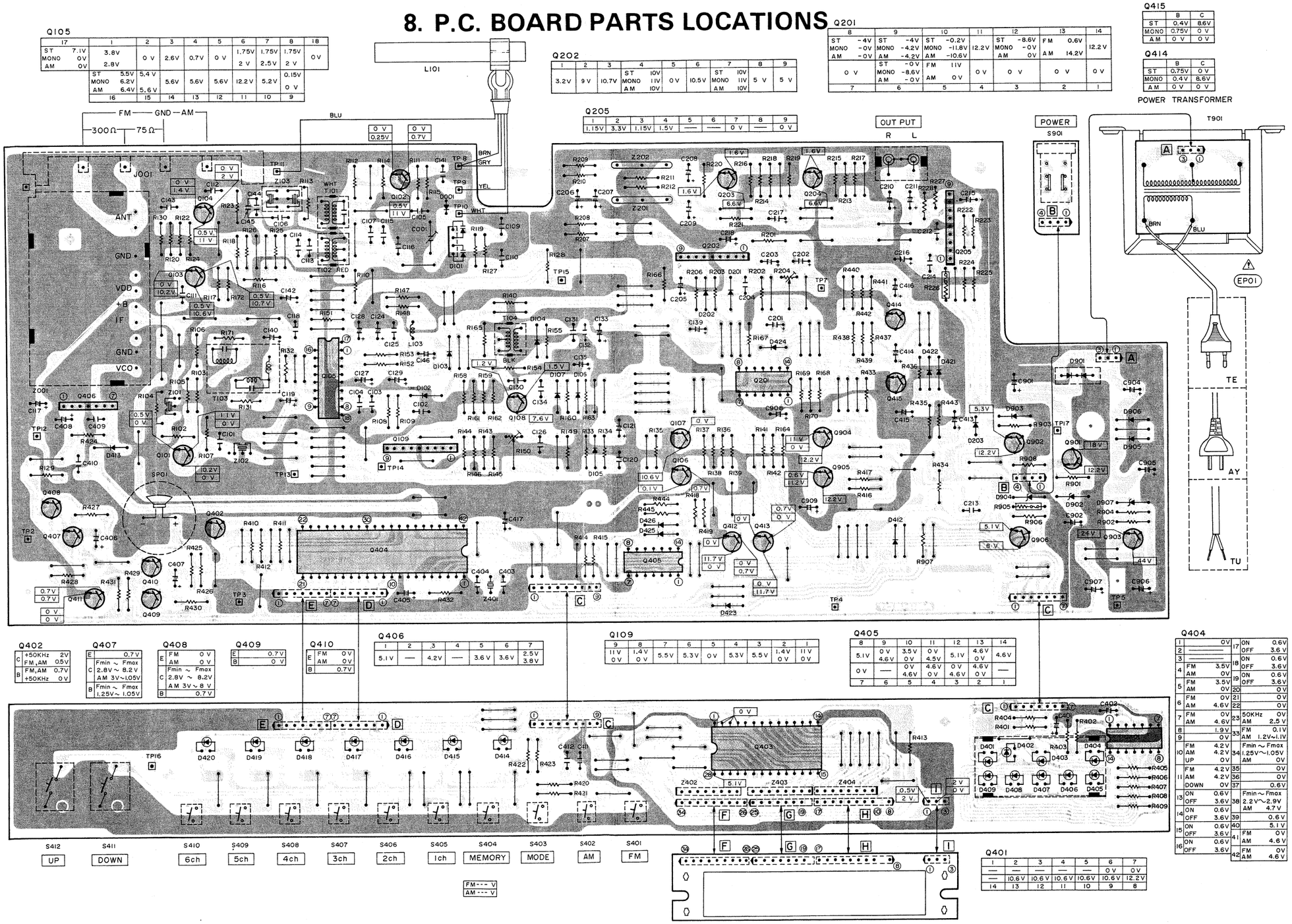


Figure 19

8. P.C. BOARD PARTS LOCATIONS



Q105

17	1	2	3	4	5	6	7	8	18
ST 7.1V MONO 0V AM 0V	3.8V 2.8V	0 V	2.6V	0.7V	0 V	1.75V 2 V	1.75V 2.5V	1.75V 2 V	0V
	ST 5.5V MONO 6.2V AM 6.4V	5.4 V 5.6 V	5.6V	5.6V	5.6V	12.2 V	5.2V	0.15V 0 V	
	16	15	14	13	12	11	10	9	

Q202

1	2	3	4	5	6	7	8	9
3.2V	9 V	10.7V	ST 10V MONO 11V AM 10V	0 V	10.5V	ST 10V MONO 11V AM 10V	5 V	5 V

Q205

1	2	3	4	5	6	7	8	9
1.15V	3.3V	1.15V	1.5V	—	—	0 V	—	0 V

Q201

8	9	10	11	12	13	14
ST -4V MONO -0V AM -0V	ST -4V MONO -4.2V AM -4.2V	ST -0.2V MONO -11.8V AM -10.6V	12.2V	ST -8.6V MONO -0V AM 0V	FM 0.6V AM 14.2V	12.2V
0 V	ST -0V MONO -8.6V AM -0V	FM 11V AM 0V	0 V	0 V	0 V	0 V
7	6	5	4	3	2	1

Q415

	B	C
ST	0.4V	8.6V
MONO	0.75V	0 V
AM	0 V	0 V

Q414

	B	C
ST	0.75V	0 V
MONO	0.4V	8.6V
AM	0 V	0 V

Q402

C	+50KHz 2V FM,AM 0.5V
B	FM,AM 0.7V +50KHz 0 V

Q407

E	0.7V
C	Fmin ~ Fmax 2.8V ~ 8.2V AM 3V~1.05V
B	Fmin ~ Fmax 1.25V~ 1.05V

Q408

E	FM 0 V AM 0 V
C	Fmin ~ Fmax 2.8V ~ 8.2V AM 3V~ 8 V
B	0.7 V

Q409

E	0.7V
B	0 V

Q410

E	FM 0V AM 0V
B	0.7V

Q406

1	2	3	4	5	6	7
5.1V	—	4.2V	—	3.6 V	3.6V	2.5V 3.8V

Q109

9	8	7	6	5	4	3	2	1
11V 0V	1.4V 0 V	5.5V	5.3V	0V	5.3V	5.5V	1.4V 0 V	11V 0V

Q405

8	9	10	11	12	13	14
5.1V	0 V 4.6V	3.5V 0 V	0 V 4.5V	5.1V	4.6V 0 V	4.6V
0 V	—	0 V 4.6V	4.6V 0 V	0 V 4.6V	4.6V 0 V	—
7	6	5	4	3	2	1

Q404

1	0V	17	ON 0.6V OFF 3.6 V
2		18	ON 0.6V OFF 3.6V
3		19	ON 0.6V OFF 3.6V
4	FM 3.5V AM 0V	20	0V
5	FM 3.5V AM 0V	21	0V
6	FM 0V AM 4.6V	22	0V
7	FM 0V AM 4.6V	23	50KHz 0V AM 2.5 V
8	1.9V	33	FM 0.1V AM 1.2V~1.1V
9	0V		
10	FM 4.2V AM 4.2V UP 0V	34	Fmin ~ Fmax 1.25V~1.05V AM 0V
11	FM 4.2V AM 4.2V DOWN 0V	35	0V
		36	0V
		37	0.6V
13	ON 0.6V OFF 3.6V	38	Fmin ~ Fmax 2.2V~2.9V AM 4.7 V
14	ON 0.6V OFF 3.6V	39	0.6 V
15	ON 0.6V OFF 3.6V	40	5.1 V
16	ON 0.6V OFF 3.6V	41	FM 0V AM 4.6 V
		42	FM 0V AM 4.6V

Q401

1	2	3	4	5	6	7
—	—	—	—	—	0 V	0 V
—	10.6 V	10.6 V	10.6 V	10.6 V	10.6 V	12.2 V
14	13	12	11	10	9	8

Figure 20

9. SCHEMATIC DIAGRAM

CAUTION:
The ⚠ mark, the symbol No. circlued with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

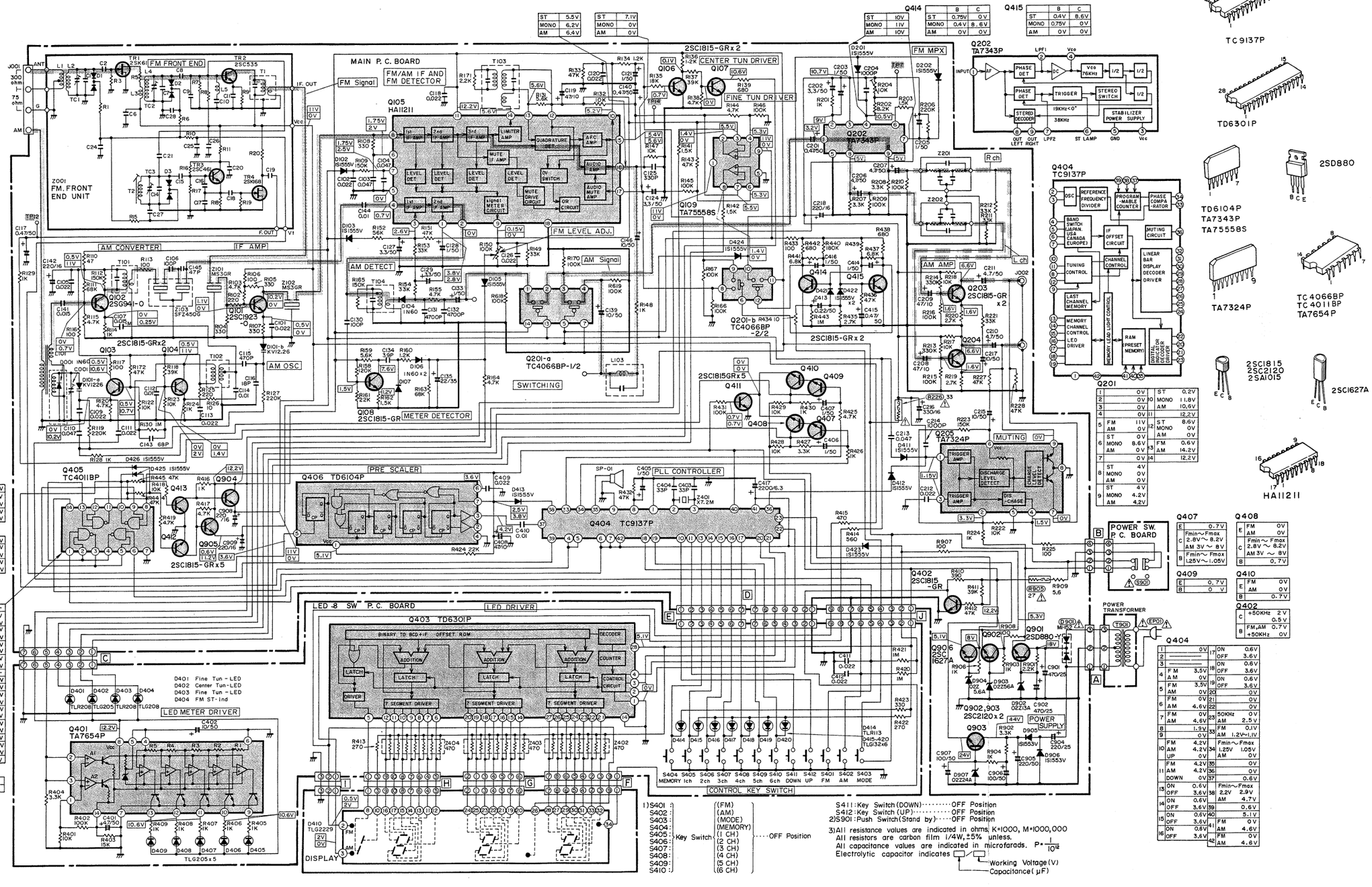
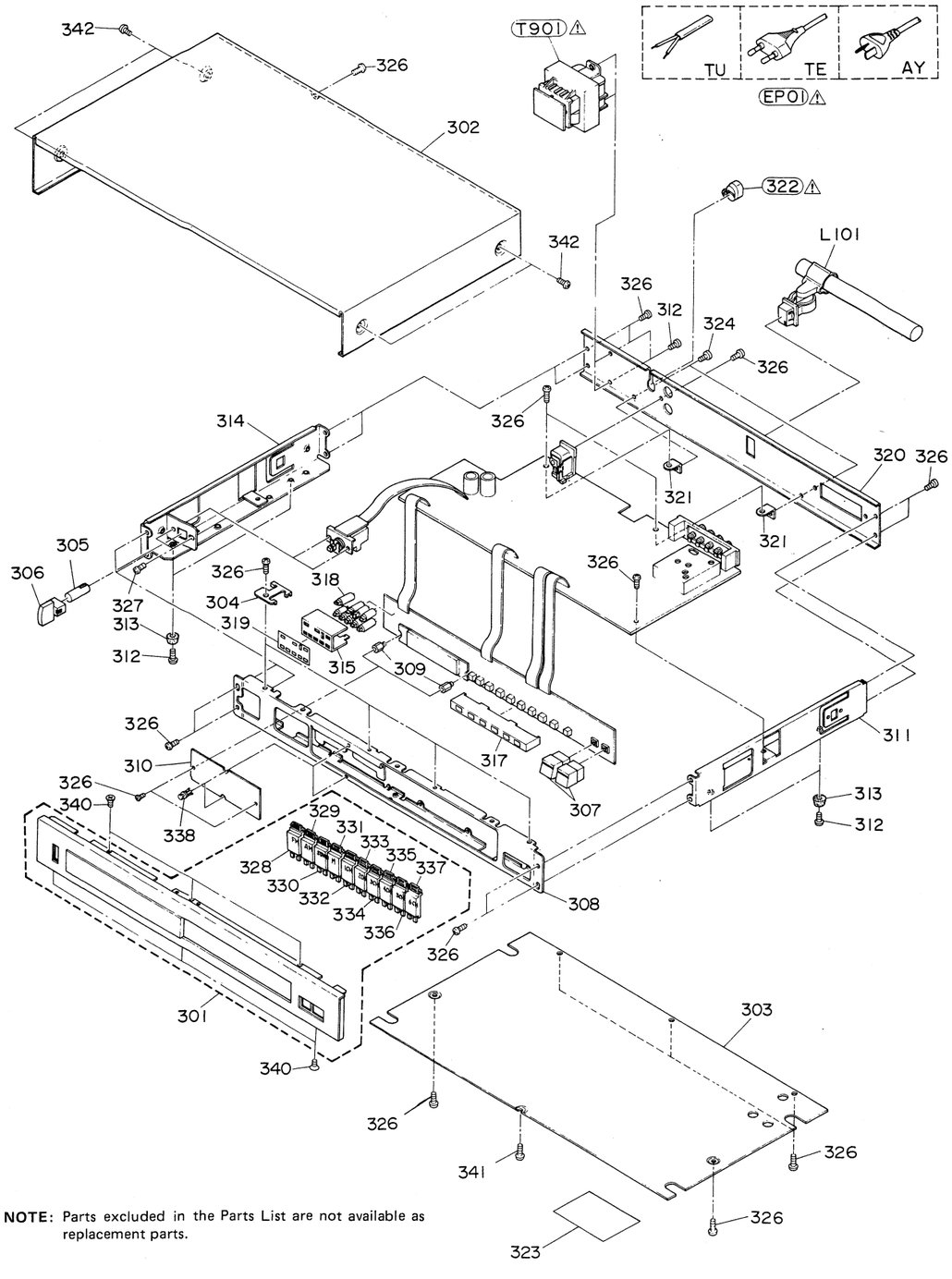


Figure 21

10. CABINET EXPLODED VIEW



NOTE: Parts excluded in the Parts List are not available as replacement parts.

Figure 22

11. PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replace only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Part No.	Description
	CABINET PARTS	
301	20017168	Panel Ass'y, Front
302	20015259	Cover, Top
305	22755389	Joint
306	22824350	Knob Ass'y, Power
307	22884109	Knob Ass'y, Up/Down
310	22838126	Plate, LED A
312	22701393	Screw, PAN Tapping, 3ϕ x 10mm
313	22828078	Foot
318	20844178	Spacer, LED
319	20844184	Sheet, Himelon
320	20015237	Plate, Jack
⚠ 322	25845528	Bush, Nylon
323	22864463	Label, Name (TE)
323	22864464	Label, Name (TU, AY)
324	22707066	Screw, FT BID, 3ϕ x 6mm
325	22707301	Screw, BID Tapping, 2.6ϕ x 8mm
326	22701326	Screw, BID Tapping, 3ϕ x 8mm
327	22707452	Screw, BID, 3ϕ x 5mm
328	22884133	Knob Ass'y, Push A (FM)
329	22884134	Knob Ass'y, Push B (AM)
330	22884135	Knob Ass'y, Push C (ST/MONO)
331	22884136	Knob Ass'y, Push D (MEMORY)
332	22884137	Knob Ass'y, Push E (1CH)
333	22884138	Knob Ass'y, Push F (2CH)
334	22884139	Knob Ass'y, Push G (3CH)
335	22884140	Knob Ass'y, Push H (4CH)
336	22884141	Knob Ass'y, Push I (5CH)
337	22884142	Knob Ass'y, Push J (6CH)
338	22705021	Rivet, Plastic 3ϕ x 3.5mm
339	22705020	Rivet, Plastic 3ϕ x 4.5mm
340	22707051	Screw, FLT 3ϕ x 6mm
341	22707502	Screw, FTBID 3ϕ x 5mm
342	22707522	Screw, FL DT 3ϕ x 6mm

Symbol No.	Part No.	Description
	SEMI CONDUCTORS	
Q101		Transistor, 2SC1923-O
Q102		Transistor, 2SC941-O
Q103, 104		Transistor, 2SC1815-GR
Q105	22114626	IC, HA11211
Q106, 107		Transistor, 2SC1815-GR
Q108		
Q109		IC, TA75558S
Q201		IC, TC4066BP
Q202		IC, TA7343P
Q203, 204		Transistor, 2SC1815-GR
Q401		IC, TA7654P
Q402		Transistor, 2SC1815-GR
Q403		IC, TD6301P
Q404		IC, TC9137P
Q405		IC, TC4011BP
Q406		IC, TD6104P
Q407, 408		Transistor, 2SC1815-GR
Q409, 410		
Q411, 412		
Q413, 414		
Q415		
Q901		Transistor, 2SD880-Y
Q902, 903		Transistor, 2SC2120
Q904, 905		Transistor, 2SC1815-GR
Q906		Transistor, 2SC1627A
D001	22115603	Diode, IN60-FD1
D101	22115599	Diode, KV1226
D102, 103		Diode, 1S1555V
D105		
D104, 106	22115603	Diode, IN60-FD1
D107		
D201, 202		Diode, 1S1555V
D401		Diode, TLR208
D402		Diode, TLG205
D403		Diode, TLR208
D404		Diode, TLR208
D405, 406		Diode, TLG205
D407, 408		
D409		
D410		Diode TLG2229
D411, 412		Diode, 1S1555V
D413		

Symbol No.	Part No.	Description
D414		Diode, TLR113 (MEMORY)
D415		Diode, TLG132 (1CH)
D416		(2CH)
D417		Diode, TLG132 (3CH)
D418		(4CH)
D419		(5CH)
D420		(6CH)
D421, 422		Diode, 1S1555V
D423, 424		
D425, 426		
⚠ D901	22115427	Diode, MI-152
D902		Diode, 02Z13A
D903		Diode, 02Z5.6A
D904		Diode, 02Z5.1A
D905, 906		Diode, 1S1553V
D907		Diode, 02Z24A
ELECTRICAL PARTS		
T101	22245206	Coil, AM OSC
T102	22264626	Transformer, IF AM
T103	22267402	Transformer, IF FM Detect
T104	22266326	Transformer, IF AM Detect
⚠ T901	22223996	Transformer, Power (TE)
⚠ T901	22224007	Transformer, Power (TU, AY)
L101	22242863	Coil, AM Antenna
L102	22241050	Coil, 18 μH
L103	22232250	Coil, Trap
Z001	22131369	Front End Pack, FM
Z101, 102	22153124	Filter, Ceramic, FM
Z103	22153184	Filter, Ceramic, AM
Z201, 202	22134115	Filter, Low Pass
Z401	22153141	Crystal, 7.2 MHz
Z402, 403	22540558	Composite Parts, Resistor
Z404		471M ohm
S401, 402	22195519	Switch, Key (CH)
S405, 406		
S407, 408		
S409, 410		
S411, 412		
S403, 404	22195219	Switch, Key (MODE/MEMORY)
⚠ S901	22195641	Switch, Push (POWER)
J001	22162468	Terminal, 4P (Antenna)
J002	22163821	Jack, 2P (Output)
SP01	22152373	Buzzer, Piezo-Electric, 2cm

Symbol No.	Part No.	Description
⚠ EP01	22176286	Cord, Power (TE)
⚠ EP01	22176628	Cord, Power (TU)
⚠ EP01	22176588	Cord, Power (AY)

CAPACITORS

J = ±5%, K = ±10%, M = ±20%, Z = –20 + 80%
ABBREVIATIONS: CD = Ceramic Disk, EL = Electrolytic
MY = Mylar Film, PP = Polypropylene

C001	22309157	10 pF, Trimmer
C101	22342223	CD, 0.022mfd, 50V, Z
C102	22342223	CD, 0.022mfd, 50V, Z
C103	22342473	CD, 0.047mfd, 50V, Z
C104	22342473	CD, 0.047mfd, 50V, Z
C105	22342223	CD, 0.022mfd, 50V, Z
C106	22362101	CD, 100pF, 50V, K
C107	22371153	MY, 0.015mfd, 50V, J
C109	22342223	CD, 0.022mfd, 50V, Z
C110	22342473	CD, 0.047mfd, 50V, Z
C111	22342223	CD, 0.022mfd, 50V, Z
C112	22342103	CD, 0.01mfd, 50V, Z
C113	22342223	CD, 0.022mfd, 50V, Z
C114	22371103	MY, 0.01mfd, 50V, J
C115	22321053	PP, 470pF, 50V, J
C116	22362180	CD, 18pF, 50V, K
C117	22488478	EL, 0.47mfd, 50V, M
C118	22342223	CD, 0.022mfd, 50V, Z
C119	22483470	EL, 47mfd, 10V, M
C120	22342223	CD, 0.022mfd, 50V, Z
C121	22488109	EL, 1mfd, 50V, M
C124	22488339	EL, 3.3mfd, 50V, M
C125	22362331	CD, 330pF, 50V, K
C126	22342223	CD, 0.022mfd, 50V, Z
C127	22488109	EL, 1mfd, 50V, M
C128	22488339	EL, 3.3mfd, 50V, M
C129	22488339	EL, 3.3mfd, 50V, M
C130	22362101	CD, 100pF, 50V, K
C131	22342472	CD, 4700pF, 50V, Z
C132	22342472	CD, 4700pF, 50V, Z
C133	22488109	EL, 1mfd, 50V, M
C134	22362390	CD, 39pF, 50V, K
C135	22487220	EL, 22mfd, 35V, M
C139	22488100	EL, 10mfd, 50V, M
C140	22488478	EL, 0.47mfd, 50V, M
C141	22371153	MY, 0.015mfd, 50V, J
C142	22485221	EL, 220mfd, 16V, M
C143	22362680	CD, 68pF, 50V, K
C144	22342103	CD, 0.01mf,d 50V, Z

Symbol No.	Part No.	Description
C145	22362470	CDm 47pF, 50V, K
C146	22488100	EL, 10mfd, 50V, M
C201	22488478	EL, 0.47mfd, 50V, M
C202	22488339	EL, 3.3mfd, 50V, M
C203	22488109	EL, 1mfd, 50V, M
C204	22371102	MY, 1000pF, 50V, J
C205	22488109	EL, 1mfd, 50V, M
C206, 207	22488479	EL, 4.7mfd, 50V, M
C208, 209	22483470	EL, 47mfd, 10V, M
C210, 211	22488479	EL, 4.7mfd, 50V, M
C212	22342223	CD, 0.022mfd, 50V, Z
C213	22342473	CD, 0.047mfd, 50V, Z
C214	22349102	CD, 1000pF, 50V, K
C215	22485100	EL, 10mfd, 16V, M
C216	22485331	EL, 330mfd, 16V, M
C217	22488100	EL, 10mfd, 50V, M
C218	22485221	EL, 220mfd, 16V, M
C401	22488479	EL, 4.7mfd, 50V, M
C402	22485100	EL, 10mfd, 16V, M
C403	22362330	CD, 33pF, 50V, K
C404	22362330	CD, 33pF, 50V, K
C405	22488109	EL, 1mfd, 50V, M
C406, 407	22488109	EL, 1mfd, 50V, M
C408	22483470	EL, 47mfd, 10V, M
C409	22342223	CD, 0.022mfd, 50V, Z
C410	22342103	CD, 0.01mfd, 50V, Z
C411, 412	22342223	CD, 0.022nfd, 50V, Z
C413	22488228	EL, 0.22mfd, 50V, M
C414	22488109	EL, 1mfd, 50V, M
C415	22488478	EL, 0.47mfd, 50V, M
C416	22488109	EL, 1mfd, 50V, M
C417	22482222	EL, 2200mfd, 6.3V, M
C901	22486102	EL, 1000mfd, 25V, M
C902	22486471	EL, 470mfd, 25V, M
C904	22486221	EL, 220mfd, 25V, M
C905	22488221	EL, 220mfd, 50V, M
C906	22488101	EL, 100mfd, 50V, M
C907	22488101	EL, 100mfd, 50V, M

RESISTORS

All resistors are carbon film ¼W, ±5% unless otherwise noted.

R102	22545221	220 ohm
R103	22545472	4.7K ohm
R104	22545331	330 ohm
R105	22545331	330 ohm
R106	22545101	100 ohm

Symbol No.	Part No.	Description
R107	22545331	330 ohm
R108	22545331	330 ohm
R109	22545154	150K ohm
R110	22545470	47 ohm
R111	22545683	68K ohm
R112	22545154	150K ohm
R113	22545101	100 ohm
R114	22545102	1K ohm
R115	22545472	4.7K ohm
R116	22545101	100 ohm
R117	22545101	100 ohm
R118	22545393	39K ohm
R119	22545224	220K ohm
R120	22545472	4.7K ohm
R122	22545103	10K ohm
R123	22545103	10K ohm
R124	22545102	1K ohm
R125	22545221	220 ohm
R126	22545100	10 ohm
R127	22545224	220K ohm
R128	22545102	1K ohm
R129	22545102	1K ohm
R130	22545105	1M ohm
R131	22545562	5.6K ohm
R132	22545103	10K ohm
R133	22545473	47K ohm
R134	22545222	2.2K ohm
R135	22545183	18K ohm
R136	22545122	1.2K ohm
R137	22545393	39K ohm
R138	22545472	4.7K ohm
R139	22545681	680 ohm
R140	22545123	12K ohm
R141	22545152	1.5K ohm
R142	22545152	1.5K ohm
R143	22545472	4.7K ohm
R144	22545472	4.7K ohm
R145	22545104	100K ohm
R146	22545104	100K ohm
R147	22545103	10K ohm
R148	22545102	1K ohm
R149	22545333	33K ohm
R150	22658495	100K ohm, Semi-fixed
R151	22545473	47K ohm
R152	22545563	56K ohm
R153	22545333	33K ohm
R154	22545333	33K ohm
R155	22545472	4.7K ohm
R158	22545124	120K ohm
R159	22545562	5.6K ohm
R160	22545122	1.2K ohm
R161	22545223	22K ohm
R162	22545152	1.5K ohm
R163	22545683	68K ohm

Symbol No.	Part No.	Description
R164	22545472	4.7K ohm
R165	22545154	150K ohm
R166	22545104	100K ohm
R167	22545104	100K ohm
R168	22545104	100K ohm
R169	22545104	100K ohm
R170	22545104	100K ohm
R171	22545222	2.2K ohm
R172	22545473	47K ohm
R201	22545102	1K ohm
R202	22545822	8.2K ohm
R203	22545152	1.5K ohm
R204	22658498	10K ohm, Semi-fixed
R205	22545104	100K ohm
R206	22545224	220K ohm
R207, 208	22545332	3.3K ohm
R209, 210	22545104	100K ohm
R211, 212	22545333	33K ohm
R213, 214	22545334	330K ohm
R215, 216	22545104	100K ohm
R217, 218	22545103	10K ohm
R219, 220	22545272	2.7K ohm
R221	22545333	33K ohm
R222	22545103	10K ohm
R223	22545154	150K ohm
R224	22545102	1K ohm
R225	22545101	100 ohm
⚠ R226	22500177	33 ohm, Fusible
R227, 228	22545473	47K ohm
R401	22545103	10K ohm
R402	22545104	100K ohm
R403	22545153	15K ohm
R404	22545332	3.3K ohm
R405, 406	22545102	1K ohm
R407, 408	22545102	1K ohm
R409	22545102	1K ohm
R410	22545391	390 ohm
R411	22545393	39K ohm
R412	22545473	47K ohm
R413	22545271	270 ohm
R414	22545561	560 ohm
R415	22545471	470 ohm
R416	22545102	1K ohm
R417	22545472	4.7K ohm
R418	22545103	10K ohm
R419	22545472	4.7K ohm
R420, 421	22545105	1M ohm
R422	22545271	270 ohm
R423	22545331	330 ohm
R424	22545223	22K ohm
R425	22545472	4.7K ohm
R426	22545102	1K ohm

Symbol No.	Part No.	Description
R427	22545332	3.3K ohm
R428	22545103	10K ohm
R429	22545103	10K ohm
R430	22545102	1K ohm
R431	22545104	100K ohm
R432	22545473	47K ohm
R433	22545101	100 ohm
R434	22545100	10 ohm
R435	22545472	4.7K ohm
R436	22545472	4.7K ohm
R437	22545682	6.8K ohm
R438	22545681	680 ohm
R439	22545184	180K ohm
R440	22545184	180K ohm
R441	22545682	6.8K ohm
R442	22545681	680 ohm
R443	22545105	1M ohm
R444, 445	22545473	47K ohm
R901	22545222	2.2K ohm
R902	22545333	3.3K ohm
R903	22545102	1K ohm
R904	22545102	1K ohm
⚠ R905	22500118	27 ohm, Fusible
R906	22545102	1K ohm
R907, 908	22545101	100 ohm
R909	22545569	5.6 ohm

ACCESSORIES

AC01	22124701	Feeder Ass'y, Antenna
AC02	22164775	Cord, US PIN
AC03	22903047	Owner's Manual

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